Public Abstract

First Name:Raymond

Middle Name:Steven

Last Name:Troy

Adviser's First Name:Robert

Adviser's Last Name:Tompson

Co-Adviser's First Name:Sudarshan

Co-Adviser's Last Name:Loyalka

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Title:Generation of Graphite Particles by Rotational/Spinning Abrasion and Their Characterization

Graphite particle generation by inter-pebble abrasion and by abrasion of pebbles with the containment vessel during operation of a Pebble Bed Reactor (PBR) is an issue of interest in the safety analysis of this class of Very High Temperature Reactor (VHTR). To understand particle generation, we have constructed an apparatus to generate graphite particles from preformed graphite hemispheres under rotational/spinning abrasive loading. We have initially used commercial grade graphites in our experiments and have generated size distributions for the abraded particles, determined particle shapes, and have measured the particle surface areas, pore volumes, and pore volume distributions of particles produced during abrasion of graphite surfaces under different conditions. The size distributions were studied using an Aerodynamic Particle Sizer (APS) and a Scanning Mobility Particle Sizer (SMPS). Most of the particles observed were in the range from 18.1 to 600 nm in diameter. The SEM micrographs showed that the particles tend to be irregular in shape and porous in nature. We have also conducted BET surface area and pore volume measurements that have verified the highly porous nature of the particles. The calculated surface area and porosity for our initial measurements of the particles from this particular grade of commercial graphite were found to be 626 meters squared per gram and 68 percent, respectively.